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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,571	06/23/2003	Masao Hori	HARA-072-046	9645

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EXAMINER	
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ART UNIT	**PAPER NUMBER**
3748	

DATE MAILED: 03/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/600,571	HORI ET AL.	
	Examiner	Art Unit	
	Tu M. Nguyen	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 08/875,577.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. An Applicant's Request for Continued Examination (RCE) filed on February 7, 2006 has been entered. Per instruction from the RCE, an Applicant's Amendment filed on January 9, 2006 has been entered. Claims 1 and 11 have been amended. Overall, claims 1-14 are pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5 and 7-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. (U.S. Patent 5,174,111) in view of Leyrer et al. (U.S. Patent 5,643,542) and legal precedent.

Re claims 1 and 11, as illustrated in Figures 1, 2, 12, 13, and 23, Nomura et al. disclose a process for purifying exhaust gas from gasoline engines comprising a step of purifying exhaust gas from a gasoline engine (2A) of a fuel-direct-injection type by contacting the exhaust gas with a single exhaust-gas purifying-use catalyst (18A) that contains a noble metal and a fire-resistant inorganic oxide (zeolite) carrying the noble metal (see lines 3-5 of Abstract);

wherein the gasoline engine (2A) of a fuel-direct-injection type is one which allows fuel to be directly injected inside a cylinder of the engine, and

wherein the exhaust gas varies between a first exhaust gas state (high engine speed and high engine load area of region B in Figure 13) having a relatively high exhaust-gas temperature at an inlet of the catalyst, and a second exhaust state (medium engine speed and medium engine load area (region A in Figure 13)) that forms a more oxidizing, low-temperature atmosphere as compared with the first exhaust gas state, depending on changes in air-fuel ratio, the second exhaust gas state having a relatively low exhaust-gas temperature at the inlet of the catalyst (also see Figures 1-2, lines 32-36 of column 8, and lines 46-57 of column 8).

Nomura et al., however, fail to specifically disclose that instead of zeolite, the fire-resistant inorganic oxide is active alumina, titania, zirconia, alumina-titania, alumina-zirconia, or titania-zirconia; the exhaust gas temperature is in a range of 350°C to 800°C for the first exhaust gas state and in a range of 200°C to 500°C for the second exhaust gas state; and that an amount of the noble metal being in a range of 0.01 to 50 g/liter with respect to the catalyst volume, an amount of the fire-resistant inorganic oxide being about 50 to 300 g/liter with respect to the catalyst volume, and a water-soluble compound being used as a source of the noble metal.

Nomura et al. disclose the claimed invention except for specifying an optimum range of exhaust gas temperature for each of the first exhaust gas state and the second exhaust gas. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum range of exhaust gas temperature for each given exhaust gas state, since it has been held that where the general conditions of a claim are disclosed in the prior

art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

As indicated in the Abstract and in the claims, Leyrer et al. teach a NOx conversion catalyst adapted to purify hydrocarbons, carbon monoxide, and NOx in the exhaust gas of an internal combustion engine. The NOx conversion catalyst comprises a catalytically active coating having a platinum metal group and a high surface area support material (claim 1). The platinum metal group is in a range of 0.01 to 5 g/liter of the catalyst volume (claim 9) and is obtained from a water-soluble compound (lines 38-49 of column 5, line 6 of column 7). The high surface area support material is a fire-resistant inorganic oxide (aluminum silicate) in a range of about 200 g/liter with respect to the catalyst volume (lines 1-3 of column 7). Leyrer et al. further teach that other active inorganic oxides such as alumina and titania are used in the support material in order to improve the processability of the aluminum silicate during the application to the support material (lines 50-59 of column 3). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the NOx conversion catalyst taught by Leyrer et al. in the process of Nomura et al., since the use thereof would have provided a catalyst having high efficiencies in removing HC, CO, and NOx in the exhaust gas.

Re claim 2, in the modified process of Nomura et al., the exhaust gas is purified by removing hydrocarbon, carbon monoxide, and nitrogen oxides from the exhaust gas by the use of the catalyst (18A).

Re claim 3, in the modified process of Nomura et al., the first exhaust gas state appears when the air-fuel ratio is in the range of 13 to 15 (in the high engine load and engine speed area,

the engine air-fuel ratio is approximately stoichiometry (lines 50-53 of column 8)), and the second exhaust gas state appears when the air-fuel ratio exceeds the above-mentioned air-fuel ratio (in the medium engine load and speed area, the engine air-fuel ratio is lean).

Re claim 4, in the modified process of Nomura et al., the second exhaust gas state appears when the air-fuel ratio ranges from more than 15 up to 50 (see paragraph above).

Re claim 5, in the modified process of Nomura et al., the catalyst (18A) includes at least one kind of noble metals, selected from the group consisting of platinum, palladium, rhodium, and iridium.

Re claim 7, in the modified process of Nomura et al., the catalyst (18A) further comprises a transition metal (vanadium) (see claim 5 of Leyrer et al.), an amount of the transition metal being in a range of 0.01 to 50 g/liter with respect to the catalyst volume (see claim 9 of Leyrer et al.), and a water-soluble compound being used as a source of the transition metal contained in the catalyst (lines 50-55 of column 5 in Leyrer et al.).

Re claim 8, in the modified process of Nomura et al.,

- the gasoline engine includes a cylinder that serves as a combustion chamber for gasoline as a fuel; an ignition plug (not shown but obviously must have); an injector (8A) that is used for injecting the fuel; a control section (10A) for controlling an ignition timing of the ignition plug and an amount of fuel injection of the injector, and

- the control section (10A) controls an air-fuel ratio depending on the injector so as to cause the gasoline engine to be in the second exhaust gas state.

Re claims 9-10, in the modified process of Nomura et al., the control section controls an air-fuel ratio depending on the injector so that a temperature of the exhaust gas at an inlet of the catalyst is not more than a threshold value so as to cause the gasoline engine to be in the second exhaust gas state (see Figure 1: step 104 with NO answer and step 106 with YES answer).

Nomura et al., however, fail to specifically disclose that the threshold value is 350°C or 300°C.

Nomura et al. disclose the claimed invention except for specifying an optimum value of exhaust gas temperature at which the catalyst is maintained under. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum value of exhaust gas temperature to maintain the catalyst under, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Re claim 12, in the modified process of Nomura et al., the catalyst further contains, as a co-catalyst, a rare-earth metal (see claim 4 of Leyrer et al.).

Re claims 13-14, in the modified process of Nomura et al., the single exhaust-gas purifying-use catalyst that consists essentially of a noble metal is obtained by impregnating a noble metal in the fire-resistant inorganic oxide.

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomura et al. in view of Leyrer et al. and legal precedent as applied to claim 1 above, and further in view of Schmidt (U.S. Patent 3,986,350).

The modified process of Nomura et al. discloses the invention as cited above, however, fails to disclose that the catalyst includes at least one of platinum and iridium.

As indicated on line 66 of column 3, Schmidt teaches that platinum is one of a noble metal utilized in their NOx catalyst (9). Thus, based on the teaching of Schmidt, it is at least obvious to one with ordinary skill in the art to realize that the catalyst used in Nomura et al. includes platinum as a noble metal.

Response to Arguments

5. Applicant's arguments with respect to the reference applied in the previous Office Action have been fully considered but they are moot in view of the new ground(s) of rejection.

Communication

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tu M. Nguyen

TMN

February 28, 2006

Tu M. Nguyen

Primary Examiner

Art Unit 3748